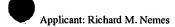The linear probing technique is described in pages 506–549 of the classic text by D. E. Knuth entitled *The Art of Computer Programming*, Volume 3, Sorting and Searching, Addison-Wesley, Reading, Massachusetts, 1973 (Cite No. 1 in the List of Prior Art Cited by Applicant submitted in conjunction with the instant application) and is shown there to be applicable only to the "open addressing" method of collision resolution, which is a nonlinked-list technique. In the same vein, in the DETAILED DESCRIPTION section of the disclose in '495 a hash table is "described as a logically contiguous, circular list of consecutively numbered, fixed-sized storage units, called cells, each capable of storing a single item called a record" (col. 4, line 33–36). This description excludes linked list implementations, which are claimed here. Since the instant application claims linked lists, not suggested by linear probing of the cited art, the subject matter claimed is not disclosed in '495.

The term "chain of records" appearing in '495 is used descriptively, and not as a term of art. In '495 it consistently refers to a sequence of consecutively occupied storage locations, and makes no sense when interpreted to include linked list implementations (col. 1, line 60–63; col. 2, line 11–17). The aforementioned text by Knuth at page 527 is cited by '495 in this context (col. 2, line 17), the discussion in that text being limited to linear probing under open addressing, a strictly nonlinked-list technique. In the same vein, in the DETAILED DESCRIPTION section of the disclosure in '495, all uses of the term "chain" (e.g. col. 5, lines 7, 10, 41, 44; col. 6, line 39) follow and are consistent with the description of a hash table only "as a logically contiguous, circular list of consecutively numbered, fixed-sized storage units, called cells, each capable of storing a single item called a record" (col. 4, line 33–36.). This definition of "chain" is inconsistent with and does not suggest the linked list technology claimed in the present application. Thus, '495 does not teach or suggest linked list technology claimed in the instant application.

Item 5 states that as to claims 1 and 3, '495 does not recite the term "linked list," but instead recites "chain of records," it being obvious to a person of ordinary skill in the art at the time the invention was made to use a linked list of records because a chain of records generates a linked list. In light of the preceding explanation that "chain" as used in '495 does not suggest linked list, this rejection should be withdrawn.

Item 5 states that as to claims 2 and 4, '495 does not recite the removal based on the determination of a maximum number or expired records, "it being obvious to a person of ordinary skill in the art at the time the invention was made to group a number of records and thus to predetermine the maximum number in the group to facilitate an efficient processing of records ...." Since claims 2 and 4 are dependent on claims 1 and 3, respectively, which have been shown in the previous paragraphs to be not suggested by the subject matter of '495, these claims are also patentable.

3.   The Office states in items 6–7 that the subject matter of claims 5–8 is fully disclosed in U.S. Patent No. 5,287,499 issued to Nemes (hereinafter '499) and claimed in Claims 1 and 2 of '499. Specifically, item 6 states that Claims 1 and 2 of '499 are "directed to an apparatus and method for information storage and retrieval wherein the memory addresses are hashed by using a chain of records having same hash address, the chaining of records is external (see claim 1, col. 17, line 1)." It then states that "the 'external chaining of records' is equivalent to a linked list of pointers/addresses of records as claimed and the 'chaining' is equivalent to being linked."

Although it is true that in the instant application "external chaining" and "chaining" are each equivalent to being linked, '499 does not teach or suggest on-the-fly deletion of at least some records based on automatic expiration of data, which is claimed here.

Item 6 states that as to claim 5 and 7, '499 does not recite the terms "linked list," "insert,"

"retrieve," or "delete," but instead recites "external chaining" and "storing," and that "it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a linked list of records because a chain of records chained by an external chaining generates a linked list" (sic). The '499 patent, however, does not teach means or methods for identifying and removing "at least some expired ones of the records" from the linked list "when the linked list is accessed" (see claims 5 and 7), which is taught by the instant application and is integral to claims 5 and 7. Thus, the rejection should be withdrawn.

Item 6 states that as to claims 6 and 8,[1] '499 does not recite a "maximum number of records" but instead recites "threshold," and that "It would have been obvious to a person of ordinary skill in the art at the time the invention was made to group a number or records for determining the threshold and thus to predetermine the maximum number for the threshold to facilitate an efficient processing of records ...." The "maximum number of records" (in the instant application) and "threshold" (in '499) serve different purposes and are structured and determined differently. In the instant application, the number is a single quantity that serves as an upper limit on the number of records removed from the linked list whenever the linked list is accessed (see claims 6 and 8), whereas in '499 the threshold is a pair of coupled quantities, an upper threshold and a lower threshold, that serve as two-way signals indicating when the system should automatically reorganize a group of records that reside in cells of the hash table into a linked list, and vice versa (col. 6, lines 44–54 and 61–65; APPENDIX). Since neither the maximum number of records nor the upper threshold can be learned from the other by a person of ordinary skill in the art from either '499 or the instant application, the rejection should be removed. Furthermore, the dependent

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1. Item 6 reads "... As to claims 7 and 8: The '499 patent does not recite a 'maximum number of records' instead recite a 'threshold' " (sic). This appears to be in error and should read "As to claims 6 and 8: ...." since the term "maximum number" appears only in claims 2, 4, 6, and 8.

claims are patentable because the independent claims on which they depend are patentable.
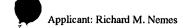
Item 7 states that there is no apparent reason why claims corresponding to those of the instant application were not presented during prosecution of '499. In light of what has been shown above, that the teachings of the instant application are not included in those of '499, the rejection should therefore be withdrawn.

Response to "Part III DETAILED ACTION," Items 8–11: <u>Claim Rejections – 35 USC § 103</u>

4.   In items 8–11, the Office rejects claims 1–8 under 35 U.S.C. § 103 (obviousness) as being unpatentable over U.S. Patent No. 5,287,499 issued to Nemes (hereinafter '499) in view of U.S. Patent No. 5,202,981 issued to Shackelford (hereinafter "Shackelford"). Specifically, item 10 states that with respect to claims 1–8, '499 teaches everything that is claimed (col. 2, line 60–64; col. 6, line 49–51) with the exception that it does not explicitly indicate the determination of "threshold" as being the "maximum number of records," and that Shackelford teaches "maximum number of pointers" (col. 3, line 61 through col. 4, line 2).

Claims 1–8 of the instant application address on-the-fly deletion of at least some records from a linked list based on automatic expiration of data, whereas '499 teaches automatic reorganization of records from linked list structure to sequential storage structure and vice versa to facilitate system efficiency. Nowhere does '499 teach deletion from the system, nor does it teach regarding automatically expiring data.

The instant application teaches and claims (claims 2, 4, 6, and 8) means and method for dynamically determining the maximum number of records to be removed on-the-fly from a linked list when that linked list is accessed. Shackelford, on the other hand, teaches an unrelated quan-

tity, the existence of a stored quantity accompanying the stream class data structure that identifies the maximum number of pointers that are permitted to exist (col. 3, line 61 through col. 4, line 2). Shackelford does not address an application with automatically expiring data, nor does he address how many items to delete. These references separately or in combination do not suggest the claims of the present application. The rejection, therefore, should be withdrawn.

5.   Item 11 states that claims 1–8 are rejected under 35 U.S.C. § 103 as being unpatentable over '499 directed to the linked lists and the step of removing, as set forth in the Double Patenting discussion, which is item 6 in the Office action.

    Neither '499 nor Shackelford suggest what is recited in claims 1, 3, 5, and 7, for example, means and methods for identifying and removing "at least some expired ones of the records" from the linked list "when the linked list is accessed." In addition, for the reasons explained in detail in the previous discussion, rejection of claims 2, 4, 6, and 8, which are directed to "dynamically determining maximum number," has already been discussed above. Thus, this rejection should be withdrawn.

    In view of the foregoing remarks, this application should be allowed to issue as a patent.

Respectfully submitted,

Richard Michael Nemes

Richard Michael Nemes

August 10, 1998